Hardwood Flooring Assembly System and Method

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention provides an assembly and method for mounting hardwood or other type of flooring assembly to a substrate.

Description of Related Art

Typically, flooring systems (e.g., hardwood floors) are made of different species of wood coming from different kinds of trees in nature such as oak, walnut, hickory, maple, and cherry just to name a few. They are all manufactured in random lengths from 18 inches up to 60 inches long and also random widths, which can vary from 2 ¼, 3, 3 ¼, 4, 5, 6 up to 7 inches wide. All hardwood floors, however, do have one thing in common which are their tongue-and-groove interlocking arrangement. Every piece of hardwood flooring has a single groove on one lengthwise side and one tongue on the opposite lengthwise side that allows the tongue of one piece to sit in the groove of the neighboring piece.

There are two different categories of hardwood floors, solid and engineered. The one category made with ¾" thickness from solid wood is called "solid hardwood floors," and the other category made out of pressed three ply with a veneer of wood attached to their top surfaces is called "engineered hardwood floors" and their thickness typically varies from 3/8 inches up to 9/16th of an inch. Figure 1 illustrates the referenced dimensions of length, thickness and width for a hardwood floor board.

There are mainly two methods that could be used to install hardwood on a surface. The first method is called nail down, and the second method is called glue down. In the United States and for that matter most of the countries around the globe, most commercial floors and residential basement floors are made of concrete, whereas the first and second floors of residential houses and townhouses are made out of wooden frame covered with plywood underlie.

Up to now the solid wood has only been used to cover the first and second floors of residential houses and townhouses as only the plywood underlie flooring allows the use of the nail down method, thus we see the solid hardwood floor is restricted in its market. Solid hardwood can not be nailed down to floors made out of concrete and also can not be glued to them first because of their solidity and their thickness and second because of their extreme measure of expansion and contraction due to atmospheric temperature and moisture degree change. For this reason, the hardwood industry came up with the second alternative called engineered hardwood floors. This type of hardwood floor is glued down to concrete floors using second method, which is the glue down method.

In the course of the last two decades the hard surface industry has also invented laminate flooring, which is a type of "floating" floor system made out of pressed composite wood covered by a decorative layer of imitation laminated wood veneer.

So far, however, no other floor covering product has replaced the durability and beauty of real solid hardwood. Engineered hardwood is very deficient. For example, when this type of wood is installed, the trapped moisture that may be present inside of concrete elevates to the wood and makes the wood susceptible to bowing, warping and

separation of the wood from the concrete underneath. Another problem with this kind of engineered wood is temperature change. When temperature fluctuates the wood starts expanding or contracting and this also results in separation of wood from concrete and appearance of gaps between the wood planks.

Another deficiency of this engineered wood is its lifetime. Once installed, the engineered wood goes through wear and tear and scratches and it must be taken up and disposed of, as it cannot be sanded and refinished for reuse. For these reasons the commercial industry is hesitant to buy, install and invest in engineered hardwood flooring.

The cost of producing engineered hardwood floor is equal to or sometimes much higher than the cost of producing solid hardwood floors. In comparison, solid hardwood flooring is a beautiful product that can be sanded and finished over and over so it may last for a few decades without replacement.

The need therefore exists for a hardwood installation system and method that overcomes the drawbacks inherent in the prior art.

SUMMARY OF THE INVENTION

The invention comprises, on the one hand, a fastening system for assembling a series of hardwood floor member and, on the other hand, to a hole making apparatus for creating proper apertures in hardwood flooring members.

A floor installation system for interlocking a plurality of flooring members, comprises a plurality of main fasteners, each of said the fasteners having an elongated central body portion, a male connector portion at a first end of the central body portion,

and a female connector portion at a second enlarged head end. The male connector portion is adapted to mate with the female portion. In addition, a plurality of resilient washer members are provided that are sized to fit on the elongated central body portion and to abut the second enlarged head end.

The plurality of main fasteners are adapted to form a series of interlocked fasteners passing widthwise through a plurality of flooring members and the resilient washer members are adapted to absorb expansion and contraction of said flooring members.

Additional fastener members, which are described below, are provided to account for variations in the installation areas. These and other features and benefits of this invention will be shown and described below with reference to the accompany drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 shows a typical hardwood floor board.

Figure 2 illustrates an example of the hole making device of the present invention.

Figure 3 illustrates the head portion of the hole making device of Figure 2.

Figure 4 illustrates the body portion of the hole making device of Figure 2.

Figure 5 illustrates a sliding drill head complex.

Figure 6 illustrates a drill machine holder complex.

Figures 7a and 7b illustrate the main fastener member of this invention.

Figure 8 illustrates a length adjuster screw used in situations where board is trimmed partially and its width is shortened.

Figure 9 illustrates a resilient washer member.

Figure 10 illustrates an adjust/reverse fastener according to this invention.

Figure 11 illustrates a female nut member according to this invention.

Figure 12 illustrates a synchro nut and synchro o-ring according to this invention.

Figure 13 illustrates a finishing end cap nut according to this invention.

Figure 14 illustrates a solid metal washer used for adjustment by filling spaces between fasteners where the fasteners are loose.

Figure 15 illustrates a depth measuring nut 99 used to measure the depth of a fastener to be added to the total length of a length adjuster screw in order to match the correct sizes.

Figure 16 illustrates a synchronizer used in conjunction with the synchro nut and synchro o-ring of Figure 12.

Figures 17a and 17b illustrate a type of male and female cross-transition lock screws used when there is a need for a transitional piece to be installed perpendicular to the direction of a particular wood strip.

Figure 18 exemplifies one example of the interlocking system according to this invention.

Figure 19 illustrates the methodology for using this installation system when a floor board is ripped or cut lengthwise to fit a narrow area.

Figure 20 illustrates the starting lock nut with a hexagonal head shown in partial cross section.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

This invention primarily comprises a hole making apparatus and a series of fasteners and their components.

The hole making device 10 is designed to make cross sectional bore holes in the body of the solid hardwood strips 1, allowing the fasteners to be seated in the referenced holes. The cross sectional bore holes pass through the strip 1 and are formed with an enlarged entrance portion to receive an enlarged head of the fastener 60 shown in Figures 7a-7b. The hole maker 10 is equipped with a measuring tool 12 which allows the precise measurement of distance between two neighboring holes.

In the preferred embodiment shown in Figure 2, the hole maker 10 is formed as a T-shaped assembly. The head 20 of the T-shaped assembly as shown in Figure 3 is designed in the form of a channel 22. The right side wall 23 of the channel 22 is adjustable to accommodate incoming hardwood strips with different widths. The left sidewall 24 of the channel 22 contains a central hole 24a, an elongated side window 24b and a windowed ruler 24c attached to the left side wall 24 from the outside. The ruler 24c has a window that matches the side window 24b of the left sidewall 24. Built over the wall window 24b, the zero of the ruler 24c precisely coincides with the central hole 24a on the left sidewall 24. The ruler 24c also is equipped with a sliding pointer 25 which slides inside the ruler's window and shows wherever the pointer's head coincides with any number on the ruler that indicates the distance of the first hole made in the body of the wood and the second hole being made at zero of the ruler which is the central hole.

The pointer 25 may be provided with a screw nut bracket, which tightens the pointer 25 at the desired point on the ruler 24c. The pointer bracket also has a spring-

loaded handle, the tail of which is a long passing pin, which passes through the side window and the first hole made in the wood. This tail acts like a locking device, avoiding the wood and the first hole to move forward and backward while the next hole is made at the central hole. When the handle is released the wood is allowed to move forward, and, since the handle is spring loaded this time the pointer's pin will engage in the second hole, and this gives way to the third hole to be made at the central hole and so on.

The body 30 of hole maker 10 provides a mounting structure for the drilling components of the hole maker 10. The mounting structure comprises rails in the form of three stainless steel rods 32a, 32b, 32c mounted to two triangular support members 34, 35 at their vortexes. The rails 32a-32c and support members 34, 35 are mounted to an adjustable support plate 37 whose height relative to the head 20 is adjustable.

The drilling components will now be described. With reference to Figure 5, a sliding drill head complex 40 which has an inner cone headed cylinder 41, and which is capable of being spun, acting like a drill head holds a two stage drill bead 43 and sits inside an outer non spinning cylinder 42. Three connection bars 45 welded to the outer non spinning cylinder 42 are positioned 120 degrees on the outer rim of the cylinder holding three sliding cylinders 46 at their other ends. When this complex is assembled, three stainless steel rods 32a-32c pass through the three sliding cylinders 46 and the complex slides forward and backward on the rods 32a-32c.

With reference to Figure 6, an adjustable drill holder complex 50, which contains three sliding cylinders 52, is connected by two bowing hands 53 that link the cylinders 52 from two sides. The hands 53 position the three cylinders 52 at symmetrical 120 degrees

from each other. To each cylinder 52, a bracket 54 is welded which is equipped with a turning knob 55 connected to a cushioned end enabling the complex to adjust and grip different types of drill machines (see element 'd' of Fig. 2). When assembled, the three stainless steel rods also pass through the sliding cylinders 52 and the holder complex 50 is positioned behind the drill head complex 40 on the rods, sliding freely forward and backward to adjust to any drill machine's body leverage.

While the hole maker 10 has been shown and described with respect to the best mode of this invention, it will be understood that the hole maker may function like a typical drill press or other assembly designed to form lateral holes in the wood member at desired positions.

The fasteners and their components will now be described with reference to Figures 7a-17b. The fasteners and their components are designed to fasten the hardwood strips in a very versatile and practical way so that any type of floor can be covered by solid hardwood.

The main fastener 60 is primarily used to fasten the strips of wood together and is designed in different lengths to accommodate, for example, 3", 3 ¼", 4", 5" and 6" widths. As shown in Figures 7a and 7b, the main fastener 60 is designed as a screw member with a male end 62 and a female end 64 such that the male end 62 may be matingly received in the female end 64. The female end 64 is also preferably formed to receive a flat-end or Phillips-end screwdriver or other torque device.

In its most simple incarnation, the present invention utilizes the main fasteners 60 to interlock adjacent boards 1, 2 whereby a first series of main fasteners 60' are disposed in the first series of boards 1 with a starting lock nut 70 threaded onto the male end 62'.

The starting lock nut 70 has a hexagonal head as shown in Figure 20. A resilient, flexible washer 75 (see Figure 9) made, preferably, of soft plastic adjusts the tension between wood and the fasteners when the wood expands or contracts. The second series of boards 2 are then aligned with the first series of boards 1 so that the male end 62'' of the main fasteners 60'' are threadingly received in the female end 64' of the fasteners 60'. This process is continues throughout the installation area.

As will be understood by those of skill in the art, installation usually requires certain boards to be trimmed or notched to fit the installation area. A special length adjuster screw 80 shown in Figure 8 may be used in situations where board is trimmed partially and its width is shortened, as this part can be clipped and shortened to accommodate for variable width adjustment. An adjusting/reversing fastener 85 is used with the length adjuster screw 80, the adjuster screw 80 and fastener 85 together function much like the main fastener 60.

As described below, the adjusting/reversing fastener 85 can also be used to reverse the installation direction.

Similarly, the present invention also comprises a female nut member 90 which converts the end of the main fastener 60 to a female joint. The female nut member 90 is especially useful when an additional hardwood area is added to an existing hardwood area.

As shown in Figures 13a and 13b, a synchronizing nut 94 and a synchronizing o-ring 95 are used in areas where wood strips are joined perpendicular to one another. The nut 94 and o-ring 95 prevent vertical and horizontal movement at the joint. The synchro nut 94 is screwed into one of the boards and the synchro o-ring 95 is disposed in the

adjacent board such that the synchro nut 94 is received in the o-ring 95. A synchronizer or marker 100 may be used to mark the alignment of the synchro nut 94 and synchro o-ring 95 on two parallel wood strips. The synchro nut 94 and synchro o-ring 95 are inserted at the intersection of the two wood strips. The location of drilling these two areas is created point-to-point. The synchronizer or marker 100 provides the exact point-to-point marking locations on both pieces of wood to be drilled for insertion of the nut 94 and o-ring 95.

A finishing end cap nut 98 combines with the length adjuster screw 80, whereby the end cap nut 98 caps and finishes the last piece of hardwood board at the finishing wall.

A solid metal washer 76 such as illustrated in Figure 14 may be used for adjustment by filling spaces between fasteners where the fasteners are loose. In addition, a depth measuring nut 99 such as shown in Figure 15 may be used to measure the depth of a fastener to be added to the total length of a length adjuster screw 80 in order to match the correct sizes.

When there is a need for a transitional piece to be installed perpendicular to the direction of a particular wood strip, male and female cross-transition lock screws 96, 97 shown in Figure 17a and 17b provide the mechanical connectors capable of performing the connection.

There are several suggested rules to be employed when starting the installation process utilizing the present invention:

1. The hole making direction is preferably left to right.

2. The drilling direction is preferably from the groove to the tongue.

3. The first strip of each row is drilled 4 inches to the right from left end of the strip.

4. When the first hole is made at 4 inches the second hole can be drilled 8 to 12 inches from it, and when this distance is set it must remain the same through out the rest of the installation process. For example, if this distance is set on an 8 inch increment, the rest of the holes will follow 8 inches from each other, except the first hole of every new row which is set back to 4 inches. The number of fasteners needed in a given area can bè calculated by dividing the length of the area, which is equal to the length of one row in this increment multiplied by width of the area divided by width of the wood strip. In a 10 foot by 10 foot room, 120 inches - length of area/8inch increment and 120 inches width of the area /3 inch width of each wood strip=600 fasteners needed, although if the increment is set on 10 inches then 480 fasteners are needed.

5. In order to keep the precise distance between the holes in every row and synchronize the holes of the neighboring rows: A- Every strip of wood must be inserted in the hole maker device one after another and when the final hole in the first wood strip is created, the second wood strip comes in and joins the first wood strip tightly, and right after the first hole in the second wood strip is created the first wood strip can exit out for installation. B-due to the size difference in the wood strips' length, the strips cannot be advanced or be left out in the installation process. The strips come out of the hole maker and in the same sequence they get installed. The first wood strip gets installed and then the second, the third and so on.

The installation process utilizing the instant invention will now be described with reference to the foregoing hole making apparatus and a series of fasteners and their components.

After the wood flooring is acclimated and the floor area is prepared, it will get covered with one layer of poly flex foam, which is a rolled product. The next step is to choose a starting wall. It is always a good idea to choose a wall which has a door way or it needs a transitional piece because at this stage this piece can be attached to the wood strips easily and efficiently. When the wall is chosen the hole making process can be started. A regular drill machine is needed to be attached to the hole maker device 10 in a way that the drill head is tightened when engaged with the spin tail of the sliding drill head complex 40, the body of the drill machine will fall in the adjustable drill holder complex 50 which now can be adjusted and tightened to the drill machine by tightening its knobs 55. The hole maker 10 is designed and equipped with a ruler 24c and sliding pointer 25 which measures the precise distance between two holes. Every hole is made at zero mark on the ruler which is the central hole of the T channel where the drill bead intercepts with the wood strip's groove, and as the first hole must be made 4 inches from the left end of the strip, we set the ruler's sliding pointer at the 4 inch mark by sliding and tightening it at that point. When the wood is inserted into the T head channel 22, width adjustment can be made by sliding the adjustable wall 23 of the channel 22 towards wood and tightening the knobs on the back of the side wall 23. When we slide the wood strip more into the T head channel the tail of the ruler's sliding pointer stops the wood. At this time if we slide the drill towards the central hole and create a hole it will be exactly placed 4 inches from the left end of the wood strip. When the first hole is made we set the

sliding pointer of the ruler on 8, 9, 10, 11 or 12 inches or any desirable distance. For instance if an 8 inch increment is chosen it has to stay at the same interval during the entire installation process except the first hole on every new row which the number is set back to 4 inches.

A resilient plastic washer 75 is combined with every fastener 60 to accommodate enough space for wood expansion and contraction. One fastener and washer combo 60, 75 is inserted in every wood strip hole.

Setting and installing the first row of wood strip at the starting wall is the most crucial part of the process. At this time ½ inch of distance must be kept between the wall and the first row of the strips. In order to secure the fasteners inserted into the bores of the first row, their exposed end at the tongue side will be tightened with a starting lock nut 70. When the first row of the strips is established the second row will join in a way that the exposed mail threads of the male end 62 of the fasteners 60 at the tongue will be tightened to the heads of the female ends 64 of the fasteners 60 exposed in the bores of the first row. Every row will be fastened to the neighboring row one after the other until the finishing wall is approached, and at this time the distance between the last complete row and the finishing wall is measured.

If the distance is almost ½ inch from the finishing wall the last fasteners are tightened and the process is ended. The shoe moldings are the final pieces to be installed. If the distance is more than ½ inch then the last row has to be cut along the length of the board to become a partial row, and ½ inch must be subtracted from the total distance measured between the last complete row and the finishing wall. The result of this subtraction is the size of the partial row; this way ½ inch gap to the finishing wall is kept.

In order to finish and fasten this partial row the hole making sequence must be kept the same way, and the parts needed to finish the partial end row are the free-headed length adjuster screws, the end cap nuts and the measuring nut.

When the free-head length adjuster screw 80 is cut and sized properly, it is joined with the end cap nut 98, and this combination 80, 98 is inserted in the bores of the partial row and is tightened to the rest of the rows. To achieve the correct size, first the free head adjuster screw 80 is tightened to the end cap nut 98. Next, the combination of the free head length adjuster screw 80 and the end cap nut 98 is inserted in the bore of the partial row wood strip as shown in Figure 19, and the measuring nut 99 is tightened to the other end of the length adjuster screw 80 as shown in Figure 19. With the depth measuring nut 99 in place, the excess amount of thread coming out of the measuring nut 99 is removed (see tip portion shown in dotted lines in Fig. 19). The measuring nut 99 at the other end is unscrewed and taken out. Now the partial wood strips are inserted and synchronized hole to hole with the neighboring row and the combination of free head adjuster screw 80 and the end cap nut 98 is tightened to the fasteners in the neighboring row. Installing the shoe moldings and hiding the gaps completes the process.

Due to the differences in the room size, shape, angle, framing, permanently stationed objects and floor environment, this invention was designed and equipped with very versatile parts to enable one to install solid hardwood efficiently, accurately, and easily.

From the foregoing description and associated drawings, it will be apparent to those of skill in the art that the present invention enables one to bring the beauty and

durability of solid hardwood to major commercial concrete based areas such as office spaces, restaurants, high-rises, condominiums and residential basements.

By introducing this invention, one can save more natural resources or at least in the long run bring the tree cutting time and tree regeneration time to equilibrium. When installed this product is floating on a spongy foam backed moisture barrier sheet which makes the solid hardwood easier to stand on for long periods (spinal cord friendly) and provides impact resistance from falling objects.

With this invention, one also does not have to worry about the same deficiencies presented by engineered hardwood, such as the warping, bowing, expansion, contraction, its short life and its detachment from concrete caused by temperature and moisture.

While the foregoing invention has been shown and described with reference to a preferred embodiment, it will be understood that various changes in form and detail may be made to the examples shown and described without departing from the spirit and scope of the invention.